CLAIMS

What is claimed is:

1. A method for analyzing defects of an integrated circuit wafer in the manufacture of the wafer, comprising:

inspecting the wafer to automatically identify a plurality of defects;

classifying defects from the plurality of defects into a plurality of groups including a first and a second group, the first group including only defects having a reported size that is at least as small as a first predetermined size and the second group including only defects having a reported size that is at least as large as the first predetermined size;

selecting for further review, defects from the second and first groups respectively in a ratio of N_y:N_x, where N_y/N_x is larger than the ratio of the number of defects in the second group to the number of defects in the first group.

2. A method according to claim 1, wherein in the step of classifying, the second group includes only defects having a reported size that is at least as small as a second predetermined size larger than the first predetermined size,

wherein the plurality of groups further includes a third group including only defects having a reported size that is at least as large as the second predetermined size,

further comprising the step of selecting for further review, defects from the third group in a ratio of N_z:N_y, where N_z/N_y is larger than the ratio of the number of defects in the third group to the number of defects in the second group.

3. A method according to claim 1, wherein in the step of classifying, the second group includes only defects having a reported size that is at least as small as a second predetermined size larger than the first predetermined size,

wherein the plurality of groups further includes a third group including only defects having a reported size that is at least as large as the second predetermined size,

further comprising the step of selecting for further review, defects from the third group in a ratio of N_z:N_x, where N_z/N_x is larger than the ratio of the number of defects in the third group to the number of defects in the first group.

4. A method according to claim 1, wherein the second group includes only defects having a reported size that is larger than the first predetermined size.

5. A method according to claim 1, wherein the first group includes only defects having a reported size that is smaller than the first predetermined size.

6. A method according to claim 1, wherein the step of classifying comprises the steps of:

pre-sorting the plurality of defects identified in the step of inspecting, into n+1 monotonically increasing size ranges S_0, ..., S_m, ..., S_n, where n>1 and 0<=m<n; and

classifying only defects from size ranges S_0, ..., S_m into the first group and classifying only defects from size ranges S_{m+1}, ..., S_n into the second group.

7. A method according to claim 6, wherein

$$N_y/N_x \geq \frac{\sum_{i=m}^{n}(m+\alpha)D_i}{\sum_{i=m}^{n}D_i},$$

where t is an integer between 0 and n inclusive, α is a non-negative integer, and D_i is the number of defects in size range S_i, i=0,...,n

8. A method according to claim 7, wherein t=1.

9. A method according to claim 7, wherein t=m+1.

10. A method according to claim 6, wherein $N_x = X/(X+Y)$ and $N_y = Y/(X+Y)$, where

$$X = \sum_{i=t}^{n} Di$$

$$Y = \sum_{i=t}^{n} (i+\alpha) Di$$

where t is an integer between 0 and n inclusive, α is an integer, and D_i is the number of defects in size range S_i, i=0,...,n.

11. A method according to claim 6, wherein

$$N_y / N_x \geq \frac{\sum_{i=m+1}^{n} (i+\alpha) D_i}{\sum_{i=m+1}^{n} D_i},$$

where α is a non-negative integer, and D_i is the number of defects in size range S_i, i=0,...,n

12. A method according to claim 11, wherein α =1.

13. A method according to claim 1, wherein N_y is larger than N_x.

14. A method according to claim 1, further comprising the step of repeating the steps of inspecting, classifying and selecting for each of a plurality of wafers in a lot.

15. A method according to claim 14, wherein the step of inspecting is performed for all wafers in the plurality of wafers before the step of classifying begins for any wafer in the plurality of wafers.

16. A method according to claim 1, further comprising the step of reviewing the defects selected in the step of selecting for further review.

17. A method according to claim 16, wherein the step of reviewing, for each particular defect, comprises the step of observing the given defect via a member of the group consisting of a scanning electron microscope and an optical microscope.

18. A method according to claim 16, wherein the step of reviewing, for each particular defect, comprises the step of analyzing the given defect manually.

19. A method according to claim 16, wherein the step of reviewing, for each particular defect, comprises the step of analyzing the given defect via an automatic defect review system.

20. A method according to claim 16, further comprising the step of scrapping at least a die of the wafer in response to the step of reviewing.

21. Apparatus for analyzing defects of an integrated circuit wafer in the manufacture of the wafer, comprising:

an inspection system including means for automatically identifying a plurality of defects on the wafer;

classifying means for classifying defects from the plurality of defects into a plurality of groups including a first and a second group, the first group including only defects having a reported size that is at least as small as a first predetermined size and the second group including only defects having a reported size that is at least as large as the first predetermined size; and

selecting means for selecting for further review, defects from the second and first groups respectively in a ratio of N_y:N_x, where N_y/N_x is larger than the ratio of the number of defects in the second group to the number of defects in the first group.

22. Apparatus according to claim 21, wherein the classifying means is operable such that the second group includes only defects having a reported size that is at least as small as a second predetermined size larger than the first predetermined size,

wherein the plurality of groups further includes a third group including only defects having a reported size that is at least as large as the second predetermined size,

and wherein the selecting means is further operable to select for further review, defects from the third group in a ratio of N_z:N_y, where N_z/N_y is larger than the ratio of the number of defects in the third group to the number of defects in the second group.

23. Apparatus according to claim 1, wherein the classifying means is operable such that the second group includes only defects having a reported size that is at least as small as a second predetermined size larger than the first predetermined size,

wherein the plurality of groups further includes a third group including only defects having a reported size that is at least as large as the second predetermined size,

and wherein the selecting means is further operable to select for further review, defects from the third group in a ratio of N_z:N_x, where N_z/N_x is larger than the ratio of the number of defects in the third group to the number of defects in the first group.

24. Apparatus according to claim 21, wherein the classifying means is operable such that the second group includes only defects having a reported size that is larger than the first predetermined size.

25. Apparatus according to claim 21, wherein the classifying means is operable such that the first group includes only defects having a reported size that is smaller than the first predetermined size.

26. Apparatus according to claim 21, further comprising means for pre-sorting the plurality of defects identified by the inspection system, into n+1 monotonically increasing size ranges S_0, ..., S_m, ..., S_n, where n>1 and 0<=m<n,

and wherein the classifying means is operable to classify only defects from size ranges S_0, ..., S_m into the first group and to classify only defects from size ranges S_{m+1}, ..., S_n into the second group.

27. Apparatus according to claim 26, wherein

$$N_y / N_x \geq \frac{\sum_{i=m}^{n}(m+\alpha)D_i}{\sum_{i=m}^{n}D_i},$$

where t is an integer between 0 and n inclusive, α is a non-negative integer, and D_i is the number of defects in size range S_i, i=0,...,n.

28. Apparatus according to claim 27, wherein t=1.

29. Apparatus according to claim 27, wherein t=m+1.

30. Apparatus according to claim 26, wherein $N_x = X/(X+Y)$ and $N_y = Y/(X+Y)$, where

$$X = \sum_{i=t}^{n} Di$$

$$Y = \sum_{i=t}^{n} (i+\alpha)Di$$

where t is an integer between 0 and n inclusive, α is an integer, and where D_i is the number of defects in size range S_i, i=0,...,n.

31. Apparatus according to claim 26, wherein

$$N_y / N_x \geq \frac{\sum_{i=m+1}^{n} (i+\alpha)D_i}{\sum_{i=m+1}^{n} D_i},$$

where α is a non-negative integer, and D_i is the number of defects in size range S_i, i=0,...,n

32. Apparatus according to claim 31, wherein α =1.

33. Apparatus according to claim 21, wherein N_y is larger than N_x.

34. Apparatus according to claim 21, further comprising a review station including means for further reviewing the defects selected by the selecting means.

35. Apparatus according to claim 34, wherein the review station includes a scanning electron microscope.

36. Apparatus according to claim 34, wherein the review station includes an optical microscope.

37. Apparatus according to claim 34, wherein the means for further reviewing the defects comprises means for presenting the defects for manual review.

38. Apparatus according to claim 34, wherein the review station comprises an automatic defect review system.

39. Apparatus according to claim 21, wherein the inspection system comprises a machine vision system.